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10/796,071	03/10/2004	Richard L. Sutherland	SAIC0006-CON1	2666

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EXAMINER	
ANGEBRANNDT, MARTIN J	
ART UNIT	**PAPER NUMBER**
1756	

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/796,071	SUTHERLAND ET AL.	
	Examiner	Art Unit	
	Martin J. Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/5/05&12/19/05*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *49-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *49-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/5/05&12/19/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The response of the applicant has been read and given careful consideration. The amendment to the specification identifying the parent application is proper. The applicant has not comment on the "applicant has [an] obligation to call the most pertinent prior patent to [the] attention of [the] Patent Office in a proper fashion." [Penn Yan Boats, Inc. V. Sea Lark Boats, Inc., et al. 175 USPQ 260 (DC SFla 1972)].

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3 Claim 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281, Sutherland et al. WO98/04650, Margerum et al. '568 and Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69.

Chang '045 discloses the formation of edge faded holograms, where the diffraction efficiency decreases from the center toward the periphery. This reduces the visibility of the edges of the hologram, thereby reducing the obstructions to visibility of the driver (1/28-30, 1/50-54 and 2/10-13). This method reduces the coherence of the laser light used in the two beam exposure process so that equal amounts of expose occur throughout the holographic recording medium, but the percentage of interferometric exposure is reduced at the edges (5/42-67, 7/59-67 and 8/5-19). The reduced coherence light fails to form interference patterns and yields an essentially incoherent (uniform) exposure at the edges. (2/40-48). The formation of volume

holograms, where the interference fringes are recorded within the photosensitive material is disclosed (5/5-8). The use of dichromated gelatin is disclosed. (4/67-5/1)

Ikeda et al. EP 0087281 teaches with respect to figure 5 a master hologram, which is placed in close contact with a photosensitive layer and exposed to form a copy hologram. Figure 6 shows the formation of the diffracted beam and the passage of some of the transmitted beam, which acts as a reference beam. Figure 15-17 show scanning of the laser beam. The formation of holograms which exhibit refractive index variations in the recording layer are phase volume holograms. (6/3-9 and 8/30-36). The diffraction efficiency of the copy can be controlled by properly choosing the incident angle of the copy beam (11/1-4and 15/19-25).

Sutherland et al. WO98/04650 teaches PDLC holographic recording media, which are used to record volume holographic gratings with electrically variable diffraction efficiency. The use of two beam exposure processes with these materials is disclosed. (8/15-30 and 9/19-33) . The compositions are disclosed as using a photopolymerizable monomer, a second phase material, a photoinitiator, a co-initiator, a chain extender (or crosslinker) and optionally a surfactant. Useful photopolymerizable materials including mixtures of di, tri, tetra and penta acrylates, such as triethylethylene glycol diacrylate, trimethyolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, pentaerythritol pentacrylate and the like. (10/14-27) The use of dipentaerythritol hydroxypentacrylate is disclosed. (11/12). Useful second phase materials are described as LC materials and include E7 and cyanobiphenyls (10/28-11/26 and 19/1-22/16) . Useful photoinitiators including rose Bengal esters, fluoresceins, cyanine dyes are disclosed. (11/36-12/16) Useful co-initiators including N-phenyl glycine are disclosed. (12/17-32) Useful crosslinker/chain extenders including vinyl monomers, such as N-vinyl

pyrrolidone are disclosed. (12/33-13/8) Surfactants lower the operating voltage and useful surfactants include octanoic acid. (13/9-14/13). The recording media are placed between ITO coated slides as discussed on pages 15 and 11 and through application of voltage through these ITO electrodes are electrically switchable to control the birefringence and transmittance of the LC material within the cured polymeric matrix. Useful amounts of the various components are disclosed on page 17. The stacking of these containing multiple gratings is disclosed on page 28 with respect to figure 17. The disclosure of these for application where holographic images are desired to be switchable is disclosed. (28/31-29/3). The formation of either reflection or transmission switchable holograms is disclosed (4/30-32). A holographic mirror is recorded using a laser to produce the incident reference beam and a mirror on the opposite side the recording medium to reflect the reference beam back through the recording medium to form the object beam, which interferes with the reference beam to form the interference fringes (17/1-12). The formation of static holograms from previously switchable holograms can be achieved by using solvents to remove the liquid crystals. (29/4-22).

Margerum et al. '568 teach the use of a contact exposure through a grating mask to form diffraction gratings in PDLC recording materials. The use of a second exposure after the masked exposure is also disclosed with respect to figure 1. (5/5-57) The alternative use of a two beam holographic interference exposure is disclosed. (5/53-57, 2/27-31 and 2/54-59) The PDLC materials are coated between ITO coated glass films. (4/57-5/57). The recording of holographic patterns is emphasized. (11/33-41).

Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 teaches copying holograms to produce multiple copies of a mass market, to form copies for uses which might

damage the hologram, to change the type/composition of recording medium which the hologram is recorded in, to change the hologram to a different form or record a processed image. The use of contact copying processes is disclosed. For duplicating a transmission hologram, the holographic master is between the recording medium and the incoming reconstruction beam, where the off axis beams are the first order diffraction (VII-2a) and for duplicating a reflection hologram, the recording medium is between the holographic master and the incoming reconstruction beam, where the off axis beam is the first order diffraction (VII-2b).

It would have been obvious to one skilled in the art to modify the process of forming edge faded holograms taught by Chang '045 by using contact copy methods such as those disclosed by Ikeda et al. EP 0087281 to obviate the need to a two beam exposure apparatus and to use the PDLC holograms of Sutherland et al. WO98/04650 as the master transmission hologram and vary the diffraction efficiency of the holographic master based upon the location of the beam to form edge faded holograms to obviate the need for diffusers or varying the angle of the beam as a function of the location of the laser beam used in the scanning copy process of Ikeda et al. EP 0087281 with a reasonable expectation of forming a edge faded hologram with the desired diffraction efficiency distribution in a PDLC holographic recording medium, which can be turned on or off. The examiner cites Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 to establish that contact copying is old and well known, Ikeda et al. EP 0087281 to evidence that this extends to volume holographic recording media, Margerum et al. '568 which evidences contact exposure through a diffractive grating mask to form volume holographic patterns in PDLC recording materials. Sutherland et al. WO98/04650 where a holographic mirror is recorded using a laser to produce the incident reference beam and a mirror

on the opposite side the recording medium to reflect the reference beam back through the recording medium to form the object beam, which interferes with the reference beam to form the interference fringes (17/1-12) effectively demonstrates the use of an adjacent optical element to generate the object beam for volume holographic recording. The resultant PDLC volume hologram would be modified in the non-uniform diffraction efficiency relative to the master PDLC hologram, which relates to the motivation to change the hologram to a different form as motivation to use a copying process. The electrical control of the diffraction efficiency in a PDLC is clearly easier that moving a diffuser as taught by Chang '045 or varying the incident angle of the replay beam taught by Ikeda et al. EP 0087281 to generate the areas of reduced diffraction efficiency.

In addition to the basis provided above, the examiner notes that it would have been obvious to modify the resultant process by reversing the positions of the PDLC holographic master and the PDLC recording material and to use of reflection PDLC holographic master, rather than a transmission PDLC holographic master based upon the teachings of Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 regarding the use of contact exposure copying methods which is also old and well known. The examiner further notes that the use of an optical element (ie a mirror) to form an object beam is shown in Sutherland et al. WO98/04650 and from simple inspection, the position of the mirror in the cited portion of Sutherland et al. WO98/04650 is analogous to that of the holographic master in figure VII-2b of Caulfield, et al. "The Applications of Holography", (1970). In the case Chang '045, interference pattern formation is prevented at the edges by rendering the percentage of exposure less coherent in these areas which is the same effect achieved by reducing the diffraction efficiency of the

grating when exposure of the edge regions occurs as more of the light merely passes through the hologram when the diffraction efficiency is reduced and by further replacing the holographic recording material of Ikeda et al. EP 0087281 or Chang '045 with a PDLC holographic recording material to produce a switchable hologram with faded edges so that it could be turned off when it was not desired to be in the drivers view and processing without the need for wet development.

The method and apparatus claims are directed to contact copying of holograms, where the master hologram is electrically controllable (such as a PDLC hologram) and the holographic recording materials is a PDLC holographic recording material. The applicant correctly states that no (one) reference meets all the limitations of the claims. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The applicant raises none of the references showing the use of an electronically switchable hologram as the master splitting a single beam to generate the interference pattern. The examiner notes that the PDLC holograms of Sutherland et al. WO98/04650 are volume holograms and as such inherently generate diffracted beam(s) as shown with respect to the holographic masters of Ikeda et al. EP 0087281 and Caulfield, et al. "The Applications of Holography", (1970) and analogous to the diffraction grating of Margerum et al. '568. The applicant seems to neglect the fact that holograms are diffractive articles, which inherently diffract light (when on). The examiner notes that and Caulfield, et al. "The Applications of Holography", (1970) specifically points out that the holographic master is replayed by the replay/reconstruction beam in the contact copying process. The PDLC materials

of Sutherland et al. WO98/04650 can certainly be replayed when turned on and would therefore be able to be used as holographic masters. When in the off condition, no diffracted beams would be generated by the PDLC, no interference patterns would be generated and the exposure would be essentially uniform, which is recognized by Sutherland et al. WO98/04650. The functionality of the PDLC materials, desirability for PDLC holograms, which are electronically switchable and the use of contact exposure processes are clearly known in the art. The final question is if there is a reason to combine these. The formation of edge-faded holograms requires both interferometric exposure and non-interferometric exposure. In the prior art, this maybe achieved while using a laser for both exposures by the use of a diffuser placed in the beam path (Chang '045), adjusting the angle of the replay/reconstruction beam (Ikeda et al. EP 0087281) or not turning the PDLC hologram on (Sutherland et al. WO98/04650, leaving the beam undiffracted which is equivalent to the fixation exposure of Redfield '861). Of these, clearly the easiest is modulating the PDLC material, which provides incentive to use a PDLC material as the diffractive master and more easily enable the edge diffracted PDLC hologram to be formed. The resultant PDLC volume hologram would be modified in the non-uniform diffraction efficiency relative to the master PDLC hologram, which relates to the motivation to change the hologram to a different form as motivation to use a copying process discussed by Caulfield, et al. "The Applications of Holography", (1970). In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge

gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). As discussed above, the functionality, motivation and benefits are recognized in the prior art and therefore the hindsight is not impermissible.

With respect to claims 80-90, the applicant is asserting that conventional PDLC holograms made using single step processes result in limited only larger droplet sizes on the basis of the specification in section [0042]. What is unclear is what is meant by "conventional PDLC materials made using a single step". Perhaps this applies to PDLC materials where the polymer is not formed insitu, but is merely mixed together with the LC material to form a PDLC material. The examiner notes that Sutherland et al. WO98/04650 and Margerum et al. '568 both use the insitu polymerization technique and the argument fails to account for this, particularly in view of Sutherland using the same composition as the claimed invention.

In response to the arguments of 12/19/05, the applicant's arguments fail to appreciate that the use of contact copying methods for holograms is old and well known in the art. In this process, the incident replay/copy beam is divided into a diffracted beam and an undiffracted beam (two beams), which parallels the conventional two beam exposure process (Ikeda et al. and Caulfield) . With static holograms, the diffraction efficiency within a single area is fixed (static) and so to reduce the diffraction efficiency, the incident angle of the copy beam is varied to reduce the efficiency of the formation of the diffracted beam. (see Ikeda et al. EP 0087281). It is important to note that in holographic copying processes, the master hologram is replayed toward the photosensitive layer in the same manner as it were to be viewed except that the image is

capture by the photosensitive layer, rather than the viewer's eye. A diffraction grating mask used in a contact exposure process functions in the same manner (Margerum et al. '568 at col 5) and a the prior use of the diffraction grating with PDLC holographic recording materials in contact copying provides a reasonable expectation that a similar process using a holographic diffraction would be successful as they are analogeous. With respect to the PDLC holograms these are replayed in the same manner as other holograms, but due to the presence of the LC materials in these, the diffraction efficiency can be varied by application of an electric field which changes the orientation of the LC materials (Sutherland et al. WO 98/04650 throughout including ITO slides at pages 11 and 15). To make these static, the removal of the LC materials using a solvent is all that is required, which establishes that the teachings of these references concerning static and variable holograms are properly considered to be analogous. (Sutherland et al. WO 98/04650 at col 29.). The position of the examiner is that using a holograms, such as the electrically switchable holograms of Sutherland et al. WO 98/04650 as the master would allow control of the diffraction efficiency of the replica/copy by direct control of the diffraction efficiency of the master being copied as the beam is scanned across the surface, rather than controlling the incident angle of the replay/copy beam as taught by Ikeda et al. EP 0087281. Other than the ability to control the diffraction efficiency due to the presence of the LC materials dispersed within the hologram, the holograms static or variable, replay in the same manner and therefore would be expected by one of ordinary skill in the art to be replayed in contact with a holographic recording material to form a duplicate using a contact copying process. The direct control of the diffraction efficiency of the master is simpler (merely changing voltage) than precisely controlling the incident angle of the replay beam. Furthermore, the desirability of edge

faded holograms in heads-up displays in windshield and the like is taught by Chang '045 and thereby providing a motivation for forming them. Clearly the ease in forming a hologram with varying diffraction efficiency by merely varying the voltage is simpler to control /implement than the methods taught by Chang '045 or Ikeda et al. EP 0087281 and provides motivation to use variable holograms as masters in the manner claimed and set forth in the rejection above.

On page 8 of the reply, the applicant has misunderstood the position of the examiner with respect to Chang '045. Change is the desired result (ie a hologram with a varied diffraction efficiency) and the rejection describes using the contact copying process of Ikeda et al. by replacing the static master with a variable diffraction PDLC hologram, such as that of Sutherland et al. WO98/04650 so that the variation in the diffraction efficiency of the copy hologram can be controlled by varying the voltage, rather than the incident angle of the replay/copy beam. The discussion of Margerum et al. '568 and Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 is to establish through evidence in the record a firm basis concerning the high likelihood of success to one of ordinary skill in the art. The applicant's discussion on page 10 of the examiner's detailed position is essentially correct and in the opinion of the examiner provides motivation to combine the references in the manner described above. The rejection stands.

4 Claim 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281, Sutherland et al. WO98/04650, Margerum et al. '568 and Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69, further in view of Wreede et al. '118 and Eguchi et al. JP 03-188479.

Wreede et al. '118 teaches the contact copying of the reflection holograms (225 and 229) where the incident beam (RB2) passes through the recording medium (235) and is diffracted to

form beam (DB2) by the underlying reflection hologram. These include volume holograms in silver halide, dichromated gelatin and photopolymers. (9/8-22).

Eguchi et al. JP 03-188479 teaches the contact copying of the reflection hologram where the incident beam (4) passes through the recording medium (32) and is diffracted to form beam (41) by the underlying reflection hologram (22).

In addition to the basis provided above, the examiner cites Wreede et al. '118 and Eguchi et al. JP 03-188479 to further buttress the obviousness of the use of contact copying for reflection volume holograms.

The examiner relies upon the response above without further comment as no further arguments were directed at this rejection.

5 Claim 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 and Sutherland et al. WO98/04650, in view of Margerum et al. '568 Sturdevant '946 and Redfield '861.

Sturdevant '946 teaches a continuous process where the holographic recording medium is preexposed without any pattern using UV light (21), Then the hologram is exposed using a laser and contact exposure through a holographic master (85) and then post exposed using a UV lamp. (91). The use of protective layers and a substrate is also disclosed with respect to figure 1.

Redfield '861 teaches that the precure to deplete the oxygen and reduce the induction period is disclosed. (10/5-11) If the holographic recording medium is not used soon after the precure, then it needs to be repeated but without causing polymerization as that would reduce the exposure range and hence possible diffraction efficiency of the hologram. (1/66-2/14 and 2/43-

53) Similarly the fixation exposure can be carried out using the reference beam (12/1-20). The use of spatial light modulators is disclosed with respect to figure 1.

It would have been obvious to one skilled in the art to modify the contact copying processes disclosed by Caulfield, et al. "The Applications of Holography", (1970), pp. 66-69 by using a PDLC recording medium, such as that disclosed by Sutherland et al. WO98/04650 to form a electrically switchable hologram and to use a PDLC hologram as the master to enable the holographic master to be turned off during the precure of the acrylic photopolymers in the PDLC and the post cure to allow a uniform cure during these periods as discussed by Sturdevant '946 and Redfield '861 with a reasonable expectation of forming a useful PDLC holographic copy based upon Margerum et al. '568 which evidences contact exposure through a diffractive grating mask to form volume holographic patterns in PDLC recording materials and the use of an optical element (ie a mirror) to form an object beam is shown in Sutherland et al. WO98/04650 and from simple inspection, the position of the mirror in the cited portion of Sutherland et al. WO98/04650 is analogous to that of the holographic master in figure VII-2b of Caulfield, et al. "The Applications of Holography", (1970).

In this case, the examiner has cited Sturdevant '946 which provides motivation for a flood/uniform exposure followed by an interferometric/hologram exposure, where the flood exposure depletes the oxygen in the photopolymerizable composition and the ability to do this immediately before the interferometric/hologram exposure is beneficial as discussed by Redfield '861. The ability to perform these exposures successively while the master is in contact with the photopolymerizable holographic composition is operatble only when the holographic master is

switchable as with the PDLC materials of Sutherland et al. WO98/04650 and Margerum et al. '568. This rejection is different form the others above. The rejection stands.

6 **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Martin J Angebranndt
Primary Examiner
Art Unit 1756

02/27/2006